GRANDMOTHER FIRMWARE UPDATE V1.1.3

Nov 5, 2020

Firmware version 1.1.3 for the Grandmother contains a number of new features as well as some bug fixes.

HOW TO UPDATE YOUR FIRMWARE

1. Connect a USB cable from Grandmother to your computer.

2. Open your SysEx sending software.
NOTE: *We recommend downloading Bome SendSX for Windows or SysEx Librarian for Mac.*

3. In the SysEx software, select Grandmother as your MIDI output device.
NOTE: *In SysEx Librarian, this is located in the drop-down menu at the top of the application window. In Bome SendSX, this is located in the MIDI OUT menu on the menu bar.*

4. Select the SysEx file "Grandmother_FIRMWARE_INVALIDATE.syx" included with this download and click Send. On the Grandmother, the Arp Rate LED will start blinking red/green.

5. In the SysEx sending software, re-select Grandmother as your MIDI output device (Grandmother reboots and needs to be re-selected after INVALIDATE).

6. Select the SysEx file "Grandmother_FIRMWARE_ERASE.syx" included with this download and click Send. On the Grandmother, the Arp Rate LED will blink red three times then blink green steadily. Grandmother is now ready for new firmware.

7. Select the new firmware file "Grandmother_Firmware_v1_1_3.syx" included with this download and click Send. The Grandmother Arp Rate LED will blink yellow-orange while receiving.

8. You're done! Grandmother will reboot to the new firmware when done.

TROUBLESHOOTING

If the Grandmother Arp Rate LED is still blinking yellow-orange after the firmware has finished sending, or if the Arp Rate LED stops blinking and the unit does not reboot automatically once firmware has finished sending, you should try again.

Turn the Grandmother power off and on again, disconnect and reconnect the USB cable, and then start over at step 1.

You can retry as many times as necessary and it will not hurt the hardware. If it doesn't work after two or three tries, you should contact Moog Technical Support for further assistance.

If you have any questions or trouble with your update please contact techsupport@moogmusic.com.

V1.1.3 RELEASE NOTES

CHANGES SINCE V1.1.2:

- Enabled response to MIDI Tuning Standard sysex.
- Fixed tap-tempo regression (resets clock division to quarter notes).
- Increased maximum clock output rate to > 500Hz.
- Adaptive tempo filtering (more smoothing of tempo changes when MIDI synced, less for analog sync).
- Increased “box check” to prevent tempo pot from asserting a change unintentionally when pot is high.

CHANGES SINCE V1.1.0:

- Arp/Seq switches automatically from MIDI Sync to Internal Clock when MIDI clock is stopped.
- Added clock-input jitter reduction; fixes missed/dropped Clock Out pulses when synced to USB MIDI clock.

NEW GLOBAL SETTING

1.9 Multi Trig Reset Speed (Slow, Fast; default = Fast)
- In Global Edit mode, hold down **F#2** while pressing **C#2** to select setting 1.9; then press **F0** for SLOW or **G0** for FAST.
- If SLOW, then the envelope gate is held low for 20 ms after re-triggering when in Multi Trig mode; this allows for an audible slow re-attack with a high Sustain level. If FAST (default), then the envelope gate is held low for 4ms after re-triggering when in Muti Trig mode; this is not long enough for the envelope voltage to go low on a re-attack if it was already high, but is better for short, plucky notes where Sustain level is zero.
- SysEx Global Parameter ID# 47; Value range is 4 to 50 (milliseconds); default = 4.

V1.1.3 RELEASE NOTES

CHANGES SINCE V1.0.6:

- Synchronization and Timing Engine update - Analog Clock in/out and MIDI Clock all remain tightly in phase now, eliminating the possibility of drift between these clocks which was present in earlier firmware.
- New Behavior: **HOLD** button acts like a Sustain Pedal (KB Hold) when Arp/Seq is not running.
- The default setting for CLOCK INPUT PPQN and CLOCK OUTPUT PPQN was changed from expecting/outputting a clock every 8th note, to expecting/outputting a clock every 16th note (changed from 2 PPQN to 4 PPQN).
- Arp/Sequencer Gate Length can be adjusted using MIDI CC 106. Value 64 = 50% gate length (default).
- External Analog Clock overrides MIDI Sync.
- Added Arp/Seq Swing parameter (MIDI CC 14; global param ID 22).
- Added Multi-Trig parameter (MIDI CC 95).
- Arp/Seq **PLAY** button does not output MIDI CC 73 (can still respond to it if necessary).
  - *Improves compatibility with other Grandmother/Matriarchs.*
- Changed MIDI Clock Output default setting to “Off”.
- Can now edit global parameters via MIDI SysEx messages (documented below).
- This also exposed a number of previously-hidden parameters which can now be edited.

NEW GLOBAL PARAMETERS & FUNCTIONS AVAILABLE FROM THE KEYBOARD

In GLOBAL EDIT mode:

1.8 Multi Trig (off,on)

2.2 MIDI OUT Filter - Panel Knobs (off, on)
2.3 MIDI OUT Filter - Pitch/Mod Wheels (off, on)
2.4 MIDI OUT Filter - Keys (off, on)

3.1 Reset Global Settings (function)
3.2 Show Firmware Version (function)

V1.1.3 RELEASE NOTES

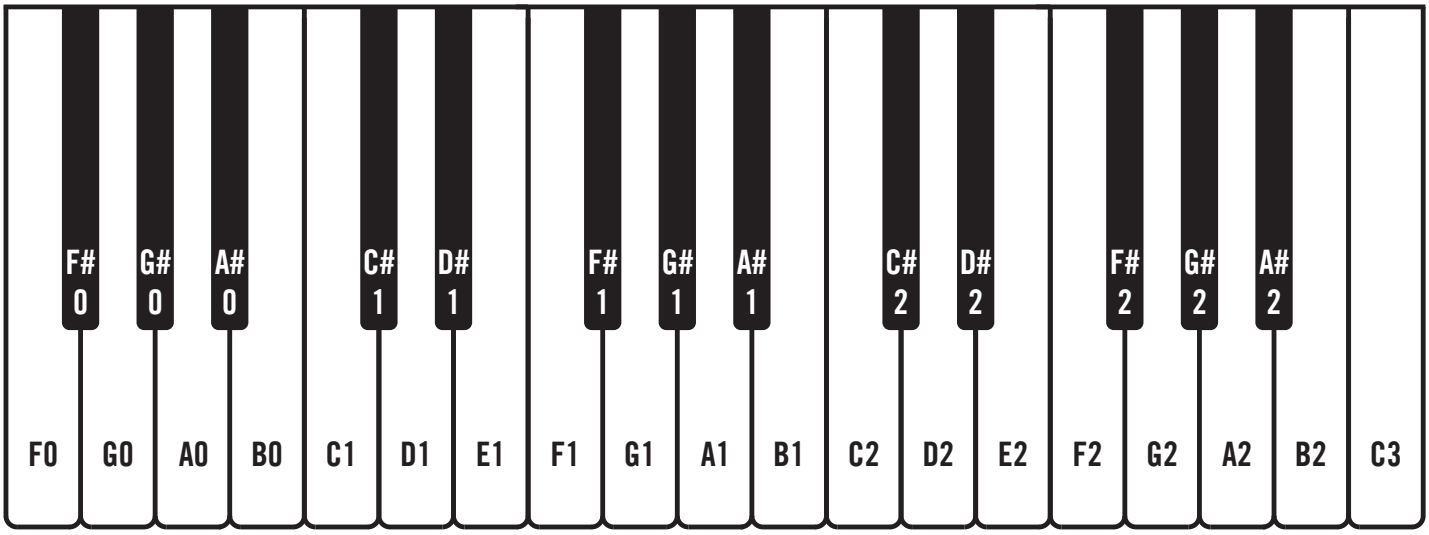
GLOBAL SETTINGS

To access Grandmother's Global Settings, simultaneously press and hold the **HOLD** button (on the Left-Hand Controller) and **SYNC** button (in Oscillator 1) until the **SYNC** button begins to blink. Now you can use the keyboard commands listed below to make any needed changes to the Global Settings. The **SYNC** button will continue to blink a number of times to indicate which Global Setting is currently selected. When you have finished making any changes, simply press the **SYNC** button to exit the Global Settings edit mode.

TIP: *You can also double-tap your Global Settings selection on a white key to update a setting and exit the edit mode.*

NOTE: *Global Settings are retained even when the power has been turned off.*

For information on advanced Global Settings visit www.moogmusic.com/grandmother.



HERE'S HOW IT WORKS

Global Settings are organized in groups of ten. An individual parameter in the chosen group is selected using one of the lower 10 black keys, starting with **F#0**. The white keys, starting with **F0**, are used to set the value of the chosen parameter. The first 10 parameters are in the default group, and no group selection is required. Additional groups are selected using one of the upper black keys, starting with **F#2**. To access these additional parameters, hold down a Group Select key while pressing the individual Parameter Select key.

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Global Parameters Default Group (Group 0)	Group Select Key	Parameter Select Key
0.1 Changing the MIDI Channel	**(none)**	**F#0**
Grandmother can send and receive data on any MIDI channel. To select the MIDI channel, press the (**F#0**) key, and then press one of the first 16 white keys (**F0** to **G2**) to select the corresponding MIDI channel (1-16). The Default is MIDI Channel 1.		
0.2 MIDI Clock Input	**(none)**	**G#0**
Grandmother's Sequencer and Arpeggiator can be set to follow MIDI Clock, and can respond to Start and Stop commands received via MIDI. Depending on your setup, you may wish for Grandmother to ignore these commands. To change this setting, press the (**G#0**) key, and then use the first three white keys to select FOLLOW MIDI CLOCK + MIDI START/STOP COMMANDS (**F0**), FOLLOW MIDI CLOCK ONLY (Ignore MIDI Start/Stop commands) (**G0**), or IGNORE ALL MIDI CLOCK + MIDI START/STOP COMMANDS (**A0**).		
0.3 MIDI Clock Output	**(none)**	**A#0**
Grandmother's Sequencer and Arpeggiator can be set to output MIDI Clock and Start and Stop commands. Depending on your setup, you may wish for Grandmother not to send these commands. To change this setting, press the (**A#0**) key, and then use the first three white keys to select SEND MIDI CLOCK + MIDI START/STOP COMMANDS (**F0**), SEND MIDI CLOCK ONLY (Don't send MIDI Start/Stop commands) (**G0**), or DON'T SEND MIDI CLOCK OR MIDI START/STOP COMMANDS (**A0**).		
0.4 Note Priority	**(none)**	**C#1**
You can select which note will have priority on Grandmother's monophonic keyboard - the highest note played, the lowest note played, or the most recent note played. To change the note priority, press the (**C#1**) key, and then use the first three white keys to select LOW (**F0**), HIGH (**G0**), or LAST (**A0**). The Default is LAST.		
0.5 Pitch Bend Range	**(none)**	**D#1**
The pitch bend range of Grandmother's **PITCH** wheel can be set anywhere from 0 to 12 semitones. To adjust the Pitch Bend Range setting, press the (**D#1**) key, and then use the lowest 13 white keys (**F0** to **D2**) to select the corresponding number of semitones (0-12). The Default is 2 semitones.		
0.6 External Clock Mode	**(none)**	**F#1**
Via the real panel **CLOCK IN** jack, Grandmother can either sync to an external clock signal, or advance each time a gate or trigger signal is received. To specify the external clock mode, first press the (**F#1**) key, and then use the first two white keys to select CLOCK (**F0**), or STEP-ADVANCE (**G0**). The Default is CLOCK.		

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Global Parameters Default Group (Group 0)	Group Select Key	Parameter Select Key
0.7 Clock Input PPQN	**(none)**	**G#1**
To be sure that Grandmother's Sequencer and Arpeggiator sync correctly to an External Clock, you can determine how many pulses are received per quarter note (PPQN). To edit the PPQN value, first press the (**G#1**) key, and then use the first eight white keys to choose the number of clock pulses received per quarter note. (**F0**) = 1 PPQN; (**G0**) = 2 PPQN; (**A0**) = 3 PPQN; (**B0**) = 4 PPQN; (**C1**) = 5 PPQN; (**D1**) = 6 PPQN; (**E1**) = 7 PPQN; (**F1**) = 8 PPQN; (**G1**) = 9 PPQN; (**A1**) = 10 PPQN; (**B1**) = 11 PPQN; (**C2**) = 12 PPQN; (**D2**) = 24 PPQN; (**E2**) = 48 PPQN. The Default is 4 PPQN (sixteenth note clock).		
0.8 Clock Output PPQN	**(none)**	**A#1**
To be sure that external devices sync correctly to Grandmother's Sequencer and Arpeggiator, you can set how many pulses are sent per quarter note (PPQN). To edit the PPQN value, first press the (**A#1**) key, and then use the first eight white keys to choose the number of clock pulses sent per quarter note. (**F0**) = 1 PPQN; (**G0**) = 2 PPQN; (**A0**) = 3 PPQN; (**B0**) = 4 PPQN; (**C1**) = 5 PPQN; (**D1**) = 6 PPQN; (**E1**) = 7 PPQN; (**F1**) = 8 PPQN; (**G1**) = 9 PPQN; (**A1**) = 10 PPQN; (**B1**) = 11 PPQN; (**C2**) = 12 PPQN; (**D2**) = 24 PPQN; (**E2**) = 48 PPQN. The Default is 4 PPQN (sixteenth note clock).		
0.9 KB Out Range	**(none)**	**C#2**
The voltage range of Grandmother's KB OUT (pitch CV) jack can be either -5 to +5 Volts, or 0 to 10 Volts. To adjust the KB OUT Range setting, press the (**C#2**) key, and then use the first two white keys to select -5V to +5V (**F0**), or 0V to 10V (**G0**). The Default is -5V to +5V.		
0.10 Local On/Off	**(none)**	**D#2**
Grandmother can be used to drive external MIDI devices, as well as its own internal sound engine and modules. In some cases, you may wish to have Grandmother only controlling an external setup. By setting the Local parameter to OFF, Grandmother's Keyboard, **PITCH** wheel, and Arpeggiator are only transmitted through MIDI, and do not use any hard-wired connections to play the internal sound engine. Additionally, when Local is set to OFF, Grandmother's **KB OUT**, **GATE OUT**, and **KB VELOCITY OUT** jacks are disengaged (because these output jacks are also hard-wired to the internal sound engine). To access the Local setting, first press the (**D#2**) key, and then use the lowest two white keys to select LOCAL OFF (**F0**), or LOCAL ON (**G0**). The Default is Local ON.		

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Global Parameters Group 1	Group Select Key	Parameter Select Key
1.1 Glide Type	**F#2**	**F#0**
Grandmother's Glide type can be changed to best suit playing style or preference. There are three options - Linear Constant Rate, Linear Constant Time, and Exponential. To change Grandmother's Glide Type, press the (**F#2** + **F#0**) keys, and then use the first three white keys to select LCR (**F0**), LCT (**G0**), or EXP (**A0**). The Default is LCR.		
1.2 Gated Glide	**F#2**	**G#0**
While Glide is in use, Gated Glide allows Grandmother to transition between the pitch of two notes only when a note is pressed. The Glide transition halts in between notes and continues when a new note is pressed. If Gated Glide is off, the transition between the pitch of two notes completes in the amount of time set by the **GLIDE** knob, regardless of whether or not a note is held. To specify the state of Gated Glide, press the (**F#2** + **G#0**) keys, and then use the first two white keys to determine if Gated Glide is OFF (**FO**), or ON (**G0**). The Default is ON.		
1.3 Transposition Behavior	**F#2**	**A#0**
This setting determines how Grandmother will behave when its Octave settings are changed via the Left-Hand Control. To specify whether Grandmother's pitch is transposed Immediately, or when a New Note is played, press the (**F#2** + **A#O**) keys, and then use the first to white keys to select New Note (**F0**), or Immediate (**G0**). The Default is New Note.		
1.4 Tap-Tempo Clock Division Persistence	**F#2**	**C#1**
This setting determines whether the clock divisions specified while Tap Tempo is in use will persist when Tap Tempo is disengaged or if the clock divisions will be reset to Eighth Notes when disengaged. Press the (**F#2** + **C#1**) keys, and then use the first two white keys to determine whether Tap-Tempo Clock Division Persistence is OFF (**F0**), or ON (**G0**). The Default is OFF.		
1.5 Velocity CV Output Range	**F#2**	**D#1**
Grandmother's **VELOCITY CV** Output can be set to transmit velocity data at two different voltage ranges. To set the **VELOCITY CV** Output range, press the (**F#2** + **D#1**) keys, and then use the first two white keys to select between -5V to +5V (**FO**), and 0V to 10V (**G0**). The Default is -5V to +5V.		
1.6 Oscillator 2 Frequency Knob Range	**F#2**	**F#1**
Hold (**F#2**) and press (**F#1**) to select. 0 Semitones / Off (**F0**), 1 Semitone (G0), 2 Semitones (**A0**) ... 7 Semitones (**F1**) is the Default... 18 Semitones (**C3**). Osc 2 Freq Knob Range controls the amount of pitch detuning available from the **FREQUENCY** knob in the Oscillator 2 section of the front panel. The default is 7 semitones; the range is 0 to 18 semitones, set using any of the white keys on the keyboard (lowest to highest white key sets range to be 0 to 18 semitones).		

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(Continued) Global Parameters Group 1	Group Select Key	Parameter Select Key
1.7 Clock Output Mode	**F#2**	**G#1**
Hold (**F#2**) and press (**G#1**) to select. Output clock only when Arp/Seq is running (**F0**) - Default, Output clock all the time (**G0**). Clock Output Mode controls when a clock signal will be present at the **CLOCK OUT** jack on the Grandmother rear panel. Options are to output clock pulses only when the internal Arpeggiator or Sequencer is running, or to output clock pulses all the time. The timing of clock pulses is determined by the tempo in BPM and the Clock Output PPQN setting.		
1.8 Multi Trig	**F#2**	**A#1**
(**F0**) = OFF (Default), (**G0**) = ON. This setting determines how the Envelope Generators will respond to each new note press on the keyboard. When MULTI TRIG is Off, the Envelope Generators will not retrigger until all keys on the keyboard are released, and a new key is played. If MULTI TRIG is On then the Envelope Generators will retrigger each time a new key is played on the keyboard. Multi Trig can also be turned on/off via MIDI CC 95.		
1.9 Multi Trig Reset Speed	**F#2**	**C#2**
Use the first two white keys to select SLOW (**F0**) or FAST (**G0**). The default is FAST. • If SLOW, then the envelope gate is held low for 20 ms after re-triggering when in Multi Trig mode; this allows for an audible slow re-attack with a high Sustain level. If FAST (default), then the envelope gate is held low for 4ms after re-triggering when in Muti Trig mode; this is not long enough for the envelope voltage to go low on a re-attack if it was already high, but is better for short, plucky notes where Sustain level is zero.		

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Global Parameters Group 2	Group Select Key	Parameter Select Key
2.1 Separate MIDI Channels	**G#2**	**F#0**
To set only **MIDI OUT** channel, go into Global Edit mode and then press and hold the highest **G#** key (**G#2**); while holding that also press the lowest black key (**F#0**). Then, the lowest 16 white keys set **MIDI OUT** channel 1-16. The original MIDI Channel global option (just pressing lowest **F#0** key by itself) continues to set both **MIDI IN** and **OUT** channels to the selected channel number.		
2.2 MIDI OUT Filter - Panel Knobs	**G#2**	**G#0**
(**F0**) = OFF, (**G0**) = ON (Default). This setting controls whether or not MIDI CC messages are output in response to changes made to the front panel controls. ON is the setting that allows messages to be sent. When MIDI Out Filter - Panel Knobs is OFF, then no MIDI CC messages are output from Grandmother in response to panel control changes.		
2.3 MIDI OUT Filter - Pitch/Mod Wheels	**G#2**	**A#0**
(**F0**) = OFF, (**G0**) = ON (Default). This setting controls whether or not MIDI CC messages are output in response to movement of the Pitch Wheel or Mod Wheel. ON is the setting that allows messages to be sent.		
2.4 MIDI OUT Filter – Keys	**G#2**	**C#1**
(**F0**) = OFF, (**G0**) = ON (Default). This setting controls whether or not MIDI Note messages are output in response to playing on the Grandmother keyboard. ON is the setting that allows MIDI notes to be sent.		

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FUNCTIONS WITHIN THE GLOBAL EDIT MODE

This firmware version introduces a couple of useful functions which are launched from within the Global Edit system. They are selected like other global parameters, but the functions activate immediately upon being selected, since there is no need to set any additional parameter value for them.

Global Parameters Group 3	Group Select Key	Parameter Select Key
3.1 Load Default Settings	**A#2**	**F#0**
This function resets all the global parameters to their default values. Hold the highest black key (**A#2**), and while holding it press the lowest black key (**F#0**). You will see the three buttons on the LHC blink rapidly for a moment to confirm that the reset happened. Resetting the global parameters also exits Global Edit mode.		
3.2 Show Firmware Version	**A#2**	**G#0**
This function indicates the currently-installed firmware version, using the lights on the LHC buttons. Hold the highest black key (**A#2**), and while holding it press the next-to-lowest black key (**G#0**). Count the number of times the **PLAY**, **HOLD**, and **TAP** buttons blink on/off to read the version number. PLAY = major version number, HOLD = minor version number, TAP = minuscule/bugfix version number. Example: this version, v1.1.0: **PLAY** button blinks one time, then **HOLD** button blinks one time, then **TAP** button blinks zero times (does not light at all).		

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EDITING PARAMETERS USING MIDI SYSEX MESSAGES

You can edit the global and some panel parameters using MIDI System Exclusive (SysEx) messages. The template for these SysEx messages is shown below.

TO SET A PARAMETER TO A VALUE:
F0 04 16 23 [Parameter ID], [value MSB], [value LSB], 00 00 00 00 00 00 00 00 [Unit ID] F7

- Values above are shown in hexadecimal format.
- If the intended parameter value is less than 128, then [value MSB] is 0 and [value LSB] is the intended parameter value. If the intended parameter value is 128 or higher, then the value MSB is the intended value divided by 128, and the value LSB is the remainder (intended value modulo 128).
- The Unit ID byte must be set to match the Unit ID of the synth you want to edit (all synths are set to Unit ID 0 by default; this value will be 0 unless you change it) or set the Unit ID value to 0x7F to address any Unit ID, or multiple units with different IDs sharing the same MIDI port.
  - ***Note***: *The byte before Unit ID (byte 14 if counting from F0 = 0) must be set to zero or the message will be ignored. This is because the same kind of SysEx message is output by the unit in reply to a request to get the value of a parameter (see below). Replies output by the unit have the byte before Unit ID set to 1, to avoid getting stuck in a MIDI feedback loop if these messages are echoed back to the unit.*

TO REQUEST A PARAMETER VALUE:
F0 04 16 3E [Parameter ID] 00 00 00 00 00 00 00 00 00 00 [Unit ID] F7

- Values above are shown in hexadecimal format.
- Unit ID must match the Unit ID of the Grandmother, or set Unit ID = 7F (all).
- Grandmother will reply with a “set parameter” SysEx message for the requested Parameter ID with its current value, with the byte before the Unit ID (byte 14 if counting from F0 = 0) set to 1 to indicate that the message is a reply coming from Grandmother.

Global parameters for sysex editing (values below are shown in decimal format):

Parameter ID	Parameter Name	Values
0	Unit ID	0-15 (Default: 0)
1	Tuning Scale	0-31 (Default: 0 / 12-TET)
2	Knob Mode	0 = Snap, 1 = Pass-Thru, 2 = Relative (Default: 2 / Relative)
3	Note Priority	0 = Low, 1 = High, 2 = Last Note (Default: 2 / Last Note)
4	Transmit Program Change	0 = Off, 1 = On (Default: 0 / Off)
5	Receive Program Change	0 = Off, 1 = On (Default: 1 / On)
6	MIDI Input Ports	0 = none, 1 = DIN only, 2 = USB only, 3 = Both (Default: 3 / Both DIN and USB)
7	MIDI Output Ports	0 = none, 1 = DIN only, 2 = USB only, 3 = Both (Default: 3 / Both DIN and USB)
8	MIDI Echo USB In	0 = Off, 1 = Echo USB In to DIN Out, 2 = Echo USB In to USB Out, 3 = Echo USB In to Both DIN and USB Out (Default: 0 / Off)
9	MIDI Echo DIN In	0 = Off, 1 = Echo DIN In to DIN Out, 2 = Echo DIN In to USB Out, 3 = Echo DIN In to Both DIN and USB Out (Default: 0 / Off)
10	MIDI Channel IN	0-15 = MIDI Channel 1-16 (Default: 0 / MIDI Channel 1)

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Global parameters for sysex editing (cont'd):

Parameter ID	Parameter Name	Values
11	MIDI Channel OUT	0-15 = MIDI Channel 1-16 (Default: 0 / MIDI Channel 1)
12	MIDI Out Filter - Keys	0 = OFF, 1 = ON (DEFAULT: 1 / ON)
13	MIDI Out Filter - Wheels	0 = Off, 1 = On (Default: 1 / On)
14	MIDI Out FIlter - Panel	0 = Off, 1 = On (Default: 1 / On)
15	Output 14-bit MIDI CCs	0 = Off, 1 = On (Default: 0 / Off)
16	Local Control: Keys	0 = Off, 1 = On (Default: 1 / On)
17	Local Control: Wheels	0 = Off, 1 = On (Default: 1 / On)
18	Local Control: Panel	0 = Off, 1 = On (Default: 1 / On)
19	Sequence Transpose Mode	0 = Relative to First Note, 1 = Relative to Middle C (Default: 0 / First Note)
20	Arp/Seq Keyed Timing Reset	0 = Off, 1 = On (Default: 0 / Off)
21	Arp FW/BW Repeats	0 = Don't Repeat end notes; 1 = Repeat end notes (Default: 1 / Repeat)
22	Arp/Seq Swing	0-16383 = 0 to 100% (Default: 8192 = 50% / no swing)
23	Sequence Keyboard Control	0 = Off, 1 = On (Default: 1 / On)
24	Delay Sequence Change	0 = Off, 1 = On (Default: 0 / Off)
25	Sequence Latch Restart	0 = Off, 1 = On
26	Arp/Seq Clock Input Mode	0 = Clock, 1 = Step-Advance Trigger (Default: 0 / Clock)
27	Arp/Seq Clock Output	0 = Always, 1 = Only When Playing (Default: 1 / When Playing)
28	Arp MIDI Control Mode	0 = Arp outputs MIDI notes, & ignores incoming MIDI when local control off. 1 = arp doesn't output MIDI notes, is controlled by incoming MIDI notes when local control is off. (Default: 0 / Arp outputs MIDI)
29	MIDI Sync Out	0 = Output MIDI Clock and Start/Stop, 1 = Output Clock but not Start/Stop, 2 = Don't output MIDI Clock or Start/Stop (Default = 2 / Don't output)
30	MIDI Sync In	0 = Follow MIDI Clock & Start/Stop, 1 = Follow Clock but ignore Start/Stop, 2 = Ignore MIDI Clock/Start/Stop (Default: 0 / Follow MIDI Clock & Start/Stop)
31	Follow Song Position Pointer	0 = Off, 1 = On (Default: 1 / On)
32	Clock Input PPQN Index	0-15 (Default: 3 / sixteenth notes [4PPQN])
33	Clock Output PPQN Index	0-15 (Default: 3 / sixteenth notes [4PPQN])

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Global parameters for sysex editing (cont'd):

Parameter ID	Parameter Name	Values
34	Pitch Bend Range	0-12 Semitones (Default: 2 Semitones)
35	Keyboard Octave Transpose	0-4 = -2 to +2 (Default: 2 / no transpose)
36	Transpose Immediately	0 = Off, 1 = On (Default: 0 / Off)
37	Glide Type	0 = Linear Constant Rate, 1 = Linear Constant Time, 2 = Exponential (Default: 0 / LCR)
38	Gated Glide	0 = Off, 1 = On (Default: 1 / On)
39	Legato Glide	0 = Off, 1 = On (Default: 0 / Off)
40	Osc 2 Freq Knob Range	0-24 Semitones (Default: 7)
41	Osc 2 Hard Sync	0 = Off, 1 = On (Default: 0 / Off)
42	Multi Trig	0 = Off, 1 = On (Default: 0 / Off)
43	Pitch Variance	0-400 = Off to +/- 40 cents in 0.1-cent increments. (Default: 0 / Off)
44	Tap-Tempo Clock Division Persistence	0 = Off, 1 = On (Default: 0 / Off)
45	KB CV OUT Range	0 = -5V to +5V, 1 = 0V to 10V (Default: 0 / -5 to +5)
46	KB VEL OUT Range	0 = -5V to +5V, 1 = 0V to 10V (Default: 0 / -5 to +5)
47	Multi Trig Reset Speed	4-50 milliseconds (Default: 4)